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Research Article

# Understanding the Nature and Impact of Digital Literacy on Rural Community Development in Bangladesh

**Md. Roni Mridha*, Zannatus Safa, Fahim Ahmed Saikat, Arifuzzaman Shaker**

Institute of Social Welfare and Research, University of Dhaka, Dhaka-1205, Bangladesh.

***Correspondence**
Md. Roni Mridha
**Email:** rony@du.ac.bd

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## Abstract

Digital literacy is increasingly recognized as a global development priority, especially in rural Bangladesh where unequal access to digital tools hinders inclusive community progress. This study investigates how digital literacy influences rural development, applying a mixed-methods approach involving a survey of 220 respondents and 7 in-depth case studies from purposively selected districts, upazilas, and villages. Guided by the Diffusion of Innovation Theory, data were collected through structured interviews and direct observation, maintaining strict ethical standards. Findings reveal that while 84% of respondents use smartphones, only 2% use personal computers, and most (60%) engage in non-functional digital activities such as social media and entertainment. None reported using platforms like Instagram, and 42% depend on mobile data. Despite the widespread ownership of devices, nearly 90% face barriers including lack of skills, training, poor connectivity, and affordability often requiring them to travel to market areas for access. Most respondents lack formal digital education and training, limiting their ability to use technology for economic development. Case studies further highlight this gap. In one village, several youths expressed strong interest in freelancing and digital jobs but had never received structured guidance on basic digital skills. While some informal benefits were noted in communication and education, few experienced any economic gain. The study underscores the urgent need for policy interventions that go beyond access calling for localized digital training centers, awareness programs, and community-based initiatives. Long-term, inclusive strategies are essential to ensure rural populations are not just digitally connected, but digitally empowered for education, livelihood, and social inclusion.

## Keywords

Digital Literacy, Rural Development, Community Empowerment, Digital Divide, Bangladesh.

## 1. Introduction

### *1.1. Study Background*

In the era of rapid technological transformation, digital literacy has emerged as a critical tool for social inclusion, education, economic participation, and empowerment, particularly in under-resourced rural regions. In Bangladesh, where nearly 61% of the population resides in rural areas (BBS, 2022), digital literacy is increasingly viewed as a pathway to

inclusive development. Despite extensive policy initiatives to advance digital inclusion, deep-rooted structural inequalities and inadequate digital literacy continue to hinder equitable access and participation across Bangladesh. Achieving sustainable inclusion demands addressing socio-economic barriers while enhancing digital skills, tolerance, and empowerment among marginalized rural and urban communities (Aziz, 2020; UNDP, 2021). Rural communities in Bangladesh face a multitude of barriers to digital engagement, including poor infrastructure, lack of formal training, limited access to devices, low income, and gender disparities in technology use (Khan et al., 2018; Yasmin, 2020). The implementation of ICT-based services such as mobile banking, e-agriculture, and online education has potential to significantly improve rural livelihoods, yet meaningful usage of such services remains limited (Ahmed et al., 2019). While smartphones are increasingly common in villages, their use is often restricted to entertainment and social media, rather than productive or developmental purposes (Chowdhury & Salam, 2020).

Digital literacy in rural Bangladesh must therefore be understood not only in terms of access, but also in terms of capability how rural individuals are equipped to meaningfully use digital tools for empowerment, education, and economic advancement. The lack of structured training or capacity-building programs restricts communities from transitioning from passive users to active participants in the digital economy (Kabir & Saidin, 2020). In this context, understanding the nature and impact of digital literacy on rural development is essential to inform inclusive policy frameworks and targeted interventions.

This study addresses a critical knowledge gap by examining how digital literacy is currently applied in rural Bangladesh and what tangible impact it has on community development, particularly in communication, education, and economic well-being. Grounded in the rural realities of the country, this research contributes to a nuanced understanding of digital inequalities and offers insights for practical, sustainable, and context-sensitive digital inclusion strategies.

### *1.2. Statement of the Problem*

Despite national efforts toward digital transformation, a persistent challenge in Bangladesh lies in the effective integration of digital literacy into the socio-economic fabric of rural communities. While access to digital devices such as mobile phones is increasing, this access does not necessarily equate to meaningful use or digital competence. Rural populations, particularly youth and women, often remain passive consumers of digital content rather than empowered users capable of leveraging technology for development-related outcomes.

Existing rural development programs in Bangladesh have generally overlooked the structural and pedagogical requirements for digital skill-building at the grassroots level. Most digital literacy interventions, where available, are fragmented, donor-driven, or urban-centric, leaving rural communities with minimal long-term support or engagement. The result is a widening gap between potential and practice where digital tools exist in the community but are rarely used to access government services, online education, health information, or income-generating opportunities.

Moreover, the absence of localized training models, community-based digital awareness, and infrastructure support such as reliable internet or electricity further compounds the issue. This gap has led to a form of "digital presence without digital power," where individuals have digital access but lack the skills, confidence, or support systems to use technology for transformative purposes. Without addressing this problem, rural communities' risk being further marginalized in an increasingly digital society. This study, therefore, seeks to critically investigate this disconnect why digital literacy has not translated into significant rural development and to explore how policy and practice might be reoriented to close this capability gap.

### *1.3. Rationality of the Study*

The rationale for this study stems from the growing recognition that digital literacy is not only a technical skill but a catalyst for inclusive development, especially in rural contexts. In Bangladesh, although digital access has expanded through mobile networks and government initiatives, a significant gap persists in the ability of rural populations to effectively utilize digital tools for education, employment, communication, and empowerment (Hasan & Islam, 2021). The present literature often focuses on urban or general national ICT trends, with limited empirical attention given to how digital literacy translates into real-life development outcomes in rural settings.

Furthermore, the success of digital literacy initiatives depends not only on infrastructure provision but also on the contextual relevance of content, language, and training models tailored to rural needs (Zaman et al., 2014). Many rural residents use digital devices for entertainment and informal communication but lack structured knowledge on how to ac-

cess online services, job platforms, or e-learning opportunities. This knowledge gap has direct implications for rural poverty, marginalization, and youth unemployment (Milon & Habib, 2023).

Additionally, global studies have emphasized that digital literacy must be embedded within broader frameworks of social inclusion, local capacity-building, and community engagement to be truly impactful (Selwyn, 2010). In Bangladesh, where rural communities often lack such enabling environments, this study is crucial for understanding the disconnect between access and usage, and for recommending interventions that go beyond superficial technological solutions.

This research, therefore, aims to fill a critical gap by exploring not just the presence of digital devices, but the depth of digital engagement and its real impact on rural life in Bangladesh offering evidence to guide future digital literacy and rural development strategies.

### *1.4. Study Objectives*

**Table 1:** Principal Objective of the Study

| Type | Objective | Indicators |
|---|---|---|
| **Principal Objective** | To explore and understand the nature, application, and impact of digital literacy on rural community development in Bangladesh. | - Presence and use of digital tools in rural settings - Perceived and actual impacts on rural life |

**Table 2:** Specific Objective of the Study

| Specific Objective No. | Objective | Indicators |
|---|---|---|
| **1** | To identify the nature, extent, and pattern of digital literacy among rural individuals across selected areas. | - Proportion of individuals who use smartphones, computers, or internet - Types of digital activities performed (education, business, social media) |
| **2** | To examine how digital literacy influences communication, education, access to government services, entertainment, and social participation in rural communities. | - Frequency of digital communication (e.g., via- Facebook, YouTube, Messenger, WhatsApp, Imo etc.) - Use of digital tools for learning, accessing services, or local networking |
| **3** | To assess the socio-economic impacts of digital literacy on income, employment, and entrepreneurship. | - Number of individuals using digital platforms for job search or income - Reported economic benefits or new opportunities due to digital skills |
| **4** | To explore the barriers and challenges that hinder effective digital literacy in rural Bangladesh. | - Self-reported constraints (e.g., affordability, training gaps, poor internet) - Number of respondents with no access to formal digital training |
| **5** | To propose context-specific policy recommendations to enhance digital inclusion and community development. | - Suggestions from participants and stakeholders - Feasibility and community interest in local digital training or awareness initiatives |

### *1.5. Operational Definition of Key-Concept*

**Table 3:** Working Definitions of this Study

| Term | General Meaning | Scholarly Definition | Meaning in This Study |
|---|---|---|---|

| | | | |
|---|---|---|---|
| **Digital Literacy** | The ability to use digital tools and technologies like smartphones, computers, and the internet. | "The ability to access, manage, understand, integrate, communicate, evaluate and create information safely and appropriately through digital technologies" (UNESCO, 2018). | In this study, digital literacy refers to rural individuals' capacity to access, understand, and use digital tools (like smartphones and internet) for basic communication, education, service access, and limited income-generating activities. |
| **Rural Community** | A group of people living in a countryside or non-urban area, often dependent on agriculture or small-scale activities. | "Communities located in areas of low population density with limited access to modern infrastructure and services" (IFAD, 2017). | Here, it refers to villages or union-based communities in selected upazilas of Bangladesh, characterized by low digital penetration, low income, and infrastructural limitations. |
| **Community Development** | A process where members of a community come together to take collective action for improving their living conditions. | "A process of enabling people to improve the quality of life in their community through self-help, education, and participatory efforts" (Bhattacharyya, 2004). | In this study, community development is understood as any positive change in education, communication, service access, or livelihood opportunities brought about through digital literacy in rural Bangladesh. |
| **Digital Divide** | The gap between individuals who have access to modern digital technology and those who do not. | "The gap between demographics and regions that have access to modern information and communications technology, and those that don't or have restricted access" (van Dijk, 2006). | This refers to the disparity in digital skills, internet access, and device ownership between rural and urban or even among different rural populations in the study areas. |
| **Socio-economic Impact** | The effect of an activity or intervention on both economic conditions and social well-being of individuals or communities. | "The effect on a community's economic activity and social structure due to external or internal changes" (World Bank, 2011). | In this study, socio-economic impact refers to changes in income opportunities, employment patterns, or educational gains among rural residents as a result of digital literacy adoption or limitations. |

### *1.6. Ethical Consideration*

This study was conducted under the academic guidance of the Institute of Social Welfare and Research, University of Dhaka, and written permission was obtained prior to initiating fieldwork and data collection. All ethical protocols were carefully maintained throughout the research process. Data collection was conducted by final-semester BSS students who received structured training and completed two courses on research methodology with 8 credit value. on ethical research practices, including confidentiality, respectful communication, and cultural sensitivity. The study instruments were reviewed and approved by the assigned academic supervisor at the Institute. Informed verbal consent, with signed confirmation, was obtained from all participants before interviews or observations. No invasive or overly personal questions were asked. All data were anonymized using unique codes, stored securely in encrypted, password-protected folders, and supported by locked physical storage for hard copies. Only aggregated findings and anonymized quotations were reported, in full compliance with institutional ethical guidelines.

## 2. Literature Review

Digital literacy has emerged as a key driver for social and economic transformation, yet existing research in rural Bangladesh often emphasizes access over functional use. Studies by Hasan and Islam (2021) and Alam and Haque (2022) highlight the rapid spread of digital tools, particularly smartphones, but provide limited insight into how rural

populations apply these tools meaningfully for development outcomes. This gap directly informs the present study, which goes beyond measuring access to explore the qualitative dimensions of digital engagement and its link to rural livelihoods. Furthermore, while Rahman and Akhter (2022) and Barkat et al. (2021) have provided valuable statistical overviews of digital adoption, few works integrate large-scale survey data with in-depth qualitative evidence from real-life rural contexts. By combining a household survey with case studies, our research addresses this methodological shortcoming, offering richer insights into local experiences.

Another limitation in existing literature is the absence of context-specific policy recommendations. Reports from UNESCO (2022) and Sultana et al. (2023) acknowledge infrastructural and training needs but often stop short of proposing actionable, localized interventions. Our study contributes to this gap by translating empirical findings into targeted policy suggestions, such as establishing community-based digital training centers tailored to rural contexts. In addition, youth and women's aspirations in digital spaces particularly informal or home-based economic roles remain underrepresented in current research (Sultana et al., 2023; Khan et al., 2023). The present study places these groups at the center of its analysis, capturing both their ambitions and the structural barriers they face.

Existing research also shows a weak link between digital literacy and tangible livelihood outcomes such as entrepreneurship, job creation, or informal income generation (Hasan & Karim, 2022; Alam & Haque, 2022). Our findings explicitly connect these domains, revealing how limited skills and training constrain economic potential despite high device ownership. Additionally, studies by Khan et al. (2023) and Rahman and Akhter (2022) point out barriers such as English-only interfaces and cultural mismatches with rural communication norms, but these remain underexplored. The present research integrates these localized barriers into the analysis, demonstrating their significant role in limiting functional digital use. Finally, although theoretical models like the Diffusion of Innovation framework have been applied in technology adoption research, their integration into rural Bangladeshi contexts is rare (Barkat et al., 2021; Alam & Haque, 2022). By grounding our investigation in this framework, we not only explain patterns of adoption but also propose strategies for accelerating innovation diffusion in rural communities.

Through addressing these gaps, the current study builds on and extends existing scholarship, offering a more holistic understanding of how digital literacy impacts rural community development in Bangladesh.

## 3. Methodology

### *3.1. Main Methods*

This study employed a mixed-methods research approach, combining both quantitative and qualitative methods to provide a comprehensive understanding of the nature and impact of digital literacy in rural Bangladesh. The mixed-methods design allowed for both breadth (via surveys) and depth (via case studies and observations) in data collection and analysis.

For the quantitative component, structured surveys were conducted among rural individuals in selected areas to gather data on digital tool usage, skills, barriers, and socio-economic outcomes. The survey data offered general patterns and measurable indicators. For the qualitative component, case studies and direct observations were used to capture the lived experiences, contextual challenges, and nuanced impacts of digital literacy. This provided insights into the local realities that quantitative data alone could not fully reflect.

### *3.2. Study Locations*

The selected study villages and their corresponding districts are as follows: Suhilpur, Brahmanbaria; Bakoi, Comilla, Chaktatardi, Narsingdi, Chitulia, Netrokona; Jamla, Jessore; Doulotpur, Khulna; and Mirat, Naogaon. These locations were chosen through purposive sampling, based on their rural characteristics, prior engagement with digital tools or development initiatives, and accessibility for field research. Each village also served as a location for one of the study's case studies. The study villages were purposively selected for their distinct rural characteristics, varying levels of digital exposure, and prior involvement in development initiatives. This diversity allowed comparative insights into access, use, and barriers. Accessibility for fieldwork and suitability as case study sites further justified their inclusion, ensuring rich, context-specific understanding of rural digital literacy.

### *3.3. Population and Sampling Technique*

The target population included rural residents aged 16 and above, representing different occupations and demographic groups. The purposive sampling techniques has applied for this study at both the village and respondent levels. This

non-probability method was selected to ensure inclusion of participants with relevant exposure or interest in digital literacy, as well as variation in age, gender, education, and occupation.

### *3.4. Sample Size*

Survey Component: A total of 220 respondents were surveyed across the 7 villages. The sample was distributed proportionately, with approximately 30–35 respondents per village, depending on population size and field access. Case Study Component: In addition to the survey, 7 in-depth case studies, one from each village were conducted using qualitative method. These case studies provided deeper contextual understanding of digital literacy practices, challenges, and lived experiences.

This combination of purposive sampling and mixed-methods data collection ensured rich, context-sensitive insights into how digital literacy affects rural community development in Bangladesh.

### *3.5. Data Collection Techniques, Tools and Respondents*

**Table 4:** Techniques, Tools of Data and Target Respondents of the Study

| Study Methods | Data Collection Methods | Data Collection Instruments | Type |
|---|---|---|---|
| **Sample Survey** | Face to Face Interview and Observation | Interview Schedule | Semi-structured |
| **In-depth Case Interviews (ICIs)** | Face to Face Interview and Observation | Case Study Guideline | Open Ended |
| **Target Respondents** | | | |
| **01.Who use digital platform for communication, education, access to government services, entertainment, and social participation in rural communities.<br>02. Who apply digital literacy for income, employment, and entrepreneurship.** | | | |

### *3.6. Validity and Reliability of the Study*

Ensuring the validity and reliability of this study was a key methodological priority. Multiple strategies were employed to strengthen the accuracy, consistency, and credibility of the findings, including expert-reviewed tools, standardized training, and data source triangulation.

To ensure content and construct validity, all research instruments including the structured survey questionnaire and case study guidelines were designed and reviewed under the supervision of an academic expert at the Institute of Social Welfare and Research, University of Dhaka. The tools were approved only after rigorous scrutiny for contextual relevance and alignment with the research objectives.
A major technique used to enhance internal validity was triangulation of data sources. The study relied on three complementary types of data:

- Quantitative data from structured surveys of 220 rural respondents;
- Qualitative data from 7 in-depth case studies and direct field observations;
- Secondary data from published reports, research articles, policy documents, and institutional records.

This triangulation of data sources allowed the researcher to cross-verify results and examine consistency across different forms of evidence. It helped reduce the risk of bias and offered a more holistic and credible understanding of how digital literacy affects rural community development.

To ensure reliability, the study maintained consistent procedures across all locations. Data collection was conducted by trained final-semester BSS students who were sensitized to ethical protocols, local cultural practices, and proper interview techniques. All enumerators followed a standardized data collection manual to maintain uniformity. Additionally, the research tools were pre-tested in a rural area not included in the final sample. Necessary revisions were made based on feedback to improve clarity and functionality. All data were collected and recorded systematically, ensuring replicability and internal consistency of the research process.

In summary, the study's validity and reliability were ensured through a rigorous design process, data source triangulation, and standardized implementation protocols.

### *3.7. Data Analysis and Presentation*

The data analysis for this study was structured around the study's objectives and guided by a thematic analytical framework. Both quantitative and qualitative data were analyzed in a complementary manner to ensure a comprehensive understanding of the nature, application, and impact of digital literacy in rural Bangladesh.

Quantitative data collected through structured surveys of 220 respondents were entered into Microsoft Excel and analyzed using descriptive statistics. Frequencies, percentages, and cross-tabulations were used to describe the demographic characteristics of the respondents, patterns of digital device usage, internet access, and perceived outcomes. This helped in identifying general trends, levels of digital literacy, and usage behavior. Tables and charts have presented in report of this study.

Seven in-depth case studies and direct observations were analyzed using Braun and Clarke's thematic analysis framework. Interviews were transcribed in Bangla, translated into English, and subjected to open coding, combining inductive insights with deductive categories guided by the study objectives and Diffusion of Innovation theory. For example, accounts of youths wanting digital jobs but lacking training were coded as "unrealized digital livelihood potential." Codes were refined into five themes: Access vs. Functional Use**,** Skills Gaps**,** Gendered Aspirations**,** Cultural/Language Disconnect**,** and Policy Needs**.** Coding reliability was ensured through double-coding by a second researcher, with discrepancies resolved by consensus. An audit trail documented coding decisions, and participant quotations were used to ground findings in lived experiences.

## 4. Findings of the Study

This section presents the core findings of the study, derived from both quantitative survey data and qualitative case studies, supported by relevant secondary literature. The presentation of findings is structured thematically based on the specific objectives of the study and the analytical framework developed earlier.

Each thematic area addresses a key dimension of digital literacy as it relates to rural community development in Bangladesh. The themes include:

1. Nature, Extent, and Pattern of Digital Literacy
2. Influence of Digital Literacy on Communication, Education and Social Participation
3. Access to Govt. Services
4. Socio-economic Impacts of Digital Literacy
5. Barriers and Challenges to Effective Digital Literacy
6. Recommendations for Policy and Community Action

The findings are presented in three layers:

- Survey Findings: Quantitative results from structured questionnaires administered to 220 respondents across 7 rural villages, summarized in descriptive statistics and tables.
- Case Study Insights: Qualitative evidence from 7 in-depth village case studies, offering narrative accounts and examples that contextualize and deepen understanding of the survey data.
- Secondary Data Support: Literature-based evidence and national/international reports are used to support and validate the primary findings, highlighting how local observations align with or diverge from broader digital inclusion trends.

This combined and layered presentation approach enhances the reliability, validity, and practical relevance of the study's conclusions.

### *4.1. Nature, Extent, and Pattern of Digital Literacy*

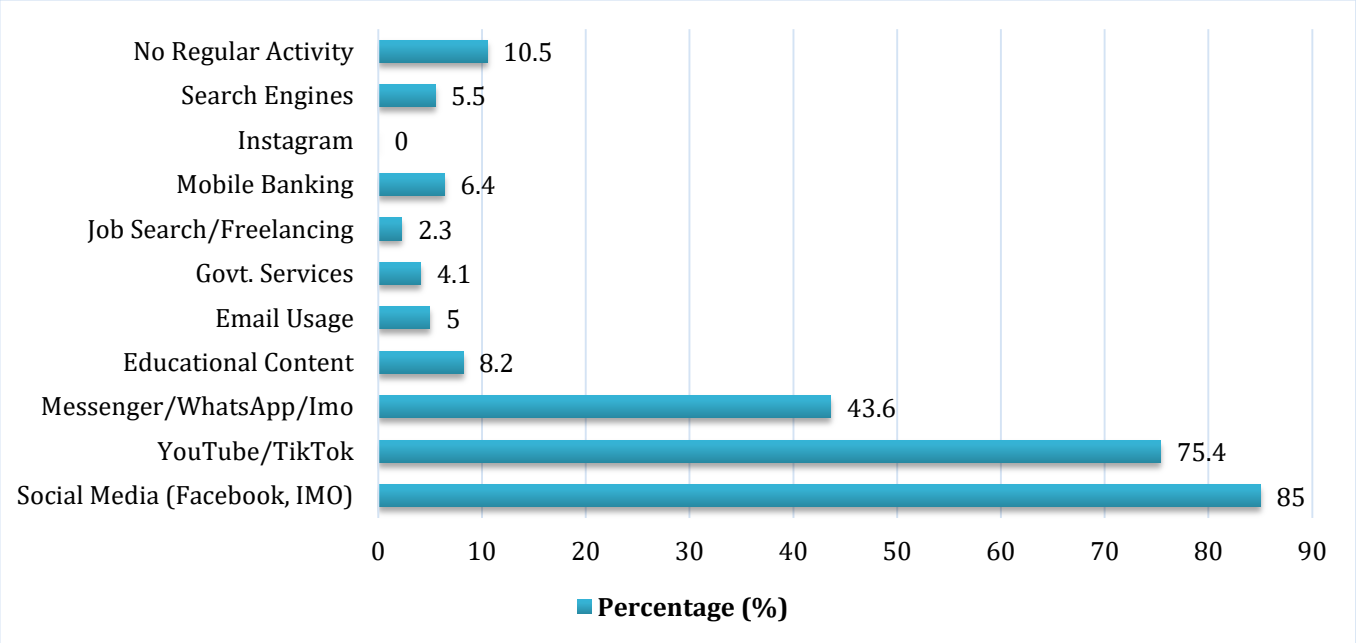
The survey conducted across 7 rural villages with 220 respondents revealed significant insights into the ownership and use of digital devices:

**Table 5:** Patterns of Device Ownership and Usage

| Indicators | Findings |
|---|---|
| Ownership of Smartphones | 84% of respondents owned or had regular access to a smartphone |
| Access to Personal Computers | Only 2% had access to a personal or shared computer |
| Primary Mode of Internet Access | 42% relied solely on mobile data; no broadband or Wi-Fi access reported |
| Main Uses of Digital Devices | 80% used them primarily for social media and entertainment (Facebook, YouTube, IMO, TikTok) |
| Use of Productive/Functional Applications | Less than 10% used digital tools for education, online work, or govt. services |
| Use of Email or Google Search | Very limited; most had never used email or formal search tools |
| Use of Instagram or LinkedIn | 0% reported using Instagram or professional platforms |
| Formal Digital Training Experience | Nearly 0%; learning was mostly informal or peer-based |
| Language of Use | Majority used Bangla apps or Bangla keyboards; limited English proficiency |

This study found that a high percentage (84%) of respondents reported owning or regularly accessing smartphones. Only 2% of the respondents reported having access to a personal or shared computer, mostly limited to schools or cyber cafés in nearby towns. 42% of respondents accessed the internet through mobile data, with no fixed broadband or Wi-Fi infrastructure in any of the surveyed villages. The majority (80%) of users engaged in non-functional digital activities such as entertainment and social media (Facebook, YouTube, IMO, TikTok). No respondents reported using Instagram, and only a few had ever used email or Google search. Less than 10% reported using digital tools for any productive or developmental purposes, such as online education, mobile banking, or job searching. Only 4% rural people use it for access to get govt. services (presented in Chart 1.).

**Chart 1:** Types of Digital Activities Among Rural Respondents




These findings indicate that digital access exists, but digital literacy remains shallow and entertainment-focused, pointing to a predominance of non-functional literacy.

Qualitative case studies supported the survey data and provided deeper insights into usage patterns: In Chitulia (Netrokona), a 19-year-old respondent owned a smartphone and used Facebook and IMO daily but had never used email or searched for government information online. In Mirat (Naogaon), a local farmer reported owning a feature phone but had no idea how to use the internet. His teenage son accessed YouTube but did not know how to download or use agricultural apps.

In Jamla (Jessore), several youths expressed interest in online freelancing and IT jobs. For example, Rasel Hossain, 20, shared:

> *"Ami onek din dhore freelancing korte chai, kintu amader grame kono training nai, amar janiyo nai kothay theke shuru korbo." (Translation: "I've wanted to do freelancing for a long time, but there's no training in our village, and I don't even know where to start.")*

Across all villages, digital literacy was mostly informal, based on peer learning or trial-and-error, with little understanding of the broader functions of digital tools beyond entertainment or casual communication.

The observed patterns align with national and global findings on rural digital inequality: According to Hasan and Islam (2021), while mobile penetration in rural Bangladesh is increasing, most users lack the digital skills necessary for meaningful engagement with online platforms beyond social media. A study by Milon and Habib (2023) found that only 12% of rural youth with internet access had ever used it for educational or economic purposes. The UNESCO Digital Literacy Global Framework (2018) emphasizes that digital literacy must move beyond basic usage toward critical and functional skills something that is largely missing in rural Bangladeshi communities. Kabir and Saidin (2020) note that informal exposure to digital tools does not ensure digital competence, and without structured intervention, rural populations remain passive users.

For theme 01, in fine it can be recognized that this study reveals that while access to digital devices especially smartphones is relatively widespread in rural Bangladesh, this does not equate to functional digital literacy. Most rural users are engaged in low-value, non-productive digital activities, and lack the skills or opportunities to use digital tools meaningfully for education, livelihoods, or empowerment. The findings highlight the urgent need for structured digital literacy training programs that focus on practical and functional skills.

### *4.2. Influence of Digital Literacy on Communication, Education and Social Participation*

The survey data from 220 respondents across seven villages revealed widespread use of digital tools for communication and entertainment, but limited use for education, service access, and social engagement.

**Table 6:** Influence of Digital Literacy by Area and Indicator (N = 220)

| Impact Area | Specific Indicator of Influence | High | Moderate | Low/No |
|---|---|---|---|---|
| **Communication** | Use of IMO, Messenger, WhatsApp for regular family and social communication | 140 (63.6%) | 56 (25.5%) | 24 (10.9%) |
| **Education** | Use of YouTube/Google for informal learning, tutorials, or school help | 18 (8.2%) | 34 (15.5%) | 168 (76.4%) |
| **Entertainment** | Using digital tools for watching videos, music, TikTok, or gaming | 132 (60.0%) | 60 (27.3%) | 28 (12.7%) |
| **Social Participation** | Joining social media-based community or religious groups, or local digital forums | 12 (5.5%) | 40 (18.2%) | 168 (76.4%) |

Table 6. represent that High Impact is mostly found in communication (63.6%) and entertainment (60%), showing widespread informal use. Education, access to services, and social participation have very low high-impact scores, revealing a functional gap despite digital access.

The qualitative data provided deeper insight into how rural individuals experience digital communication and learning. While most respondents used smartphones for daily contact and videos, very few were aware of how to use these tools for more productive purposes.

In Chaktatardi (Narsingdi), Minara Begum, 35, said:

> *"Amra protidin IMO te dekhai kori amar meyer shathe, kintu amar janiyo nai je ei phone diye sarkari kono kaj kora jai."*
> *(Translation: "I talk to my daughter every day on IMO, but I didn't know that government work could be done through this phone.")*

In Bakoi (Comilla), Sumon, 22, shared:

> *"Ami YouTube-e gaan shuni, kintu ekta baro bhai bolse je ekhane bhalo bhalo skill-er video o ache. Kintu ami bujhte pari na konta thik."*
> *(Translation: "I listen to music on YouTube, but someone told me there are useful skill-learning videos too. I just don't know which ones are good.")*

In Chitulia (Netrokona), Rafiqul Islam, 27, said:

> *"Facebook-e amra gram-er onek news pai, kintu ekta shomoshya holo je onek baje information thake."*
> *(Translation: "We get a lot of local news on Facebook, but a problem is there's also a lot of bad or false information.")*

These narratives illustrate that although digital tools are being widely used for emotional connection and social bonding, there is a lack of awareness, trust, and digital skill for more development-oriented uses like learning or service access.

The survey and case findings are strongly supported by national and global literature. Kabir and Saidin (2020) found that most rural users in Bangladesh engage with digital tools for social and recreational purposes rather than educational or civic use, largely due to low digital confidence and literacy. Hasan and Islam (2021) identified that despite high mobile phone penetration, rural users lack awareness of available e-government services and have limited ability to access or use them. A study by Akhter et al. (2022) on digital literacy in rural Bangladesh reported that while youth are active on social media, fewer than 15% had ever used any digital platform for educational purposes. Globally, van Dijk (2006) argued that informational and instrumental access are crucial second-level digital divides, often ignored in rural development programs.

In fine, the findings confirm that digital literacy is enabling basic communication and entertainment in rural Bangladesh, but its influence on education, access to services, and social participation remains minimal. This reflects a significant gap between digital access and digital utility, driven by the lack of awareness, skills, and guided exposure to more meaningful digital engagement.

### *4.3. Access to Government Services*

**Table 7:** Types of Government Services Accessed Through Digital Platforms (N = 77)

| Type of Government Service Accessed Digitally | Frequency (n) | Percentage (%) |
|---|---|---|
| **Check government allowance balance (Old Age, Widow, etc.)** | 32 | 41.6% |
| **Apply to government offices (forms, applications)** | 20 | 26.0% |
| **Withdraw old age allowance via mobile banking** | 12 | 15.6% |
| **Withdraw disability allowance via Nagad or mobile platforms** | 7 | 9.1% |
| **Search government websites for circulars or information** | 48 | 21.8% |
| **Birth registration or NID info checking** | 4 | 5.2% |
| **Agricultural subsidy or fertilizer registration** | 3 | 3.9% |
| **Access educational board results or school admission information** | 34 | 15.45% |
| ***Multiple responses received** | | |

The study reveals that access to government services through digital platforms remains limited among rural populations. The most common use is checking government allowance balances, reported by 41.6% of respondents. Other uses include applying to government offices (26%), withdrawing old-age or disability allowances via mobile banking (24.7% combined), and accessing public information like education results by 22% For agricultural subsidies, which remain relatively low (below 15%). This finding comes from 77 responses who have access on govt. services but rest 143 (65%) villagers have no access on government services through digital media or platform.

These findings highlight a growing awareness of digital benefits, particularly for social safety net programs, yet overall access remains constrained by digital literacy and platform familiarity.

A participant from Bakoi, Comilla, Nurjahan Begum (age 52), shared:

> *"Amar poa allowance ta dekhte mobile diye Nagad app use kori, kintu ar kichu bujhi na. Office-er kaaj ba application korte parina."*
> *(Translation: "I use the Nagad app on my phone to check my widow allowance, but I don't understand anything else. I can't apply to any office.")*

### *4.4. Socio-Economic Impacts of Digital Literacy*

The survey explored the extent to which rural individuals use digital literacy for income generation, employment search, or entrepreneurial activities.

**Table 8:** Use of Digital Literacy for Income, Employment, and Entrepreneurship (N=220)

| Economic Use of Digital Tools | Frequency (n) | Percentage (%) |
|---|---|---|
| Searched for job opportunities online (Facebook/Google) | 76 | 34.5 |
| Used mobile apps for selling/business | 68 | 30.9 |
| Engaged in online freelancing or remote income work (like-Photoshop) | 18 | 8.2 |
| E-banking/Mobile Banking (e.g., bKash) | 180 | 81.8 |
| Earned direct income using digital tools (Mobile Photography/Editing Apps) | 32 | 14.5 |
| Mobile Recharge & Agent Banking | 24 | 10.9 |
| Group Chat Information Service (Info about Products/services) | 40 | 18.2 |
| E-mart/Food Delivery/Dress Order and Delivery | 7 | 3.2 |
| ***Multiple responses received** | | |

The findings show that while digital tool usage for economic purposes is growing in rural areas, most activities remain basic, informal, and service-based. The most common use is mobile banking (81.8%), with platforms like bKash and Nagad used widely for sending/receiving payments, handling small business transactions, and receiving remittances.

Job searching via Facebook and Google is also notable (34.5%), reflecting growing digital awareness among youth. Around 30.9% use mobile apps or Facebook pages to promote or sell goods (e.g., food, clothing, cosmetics). A smaller percentage (14.5%) reported earning income directly by offering photo-editing or mobile photography services within the village.

Online freelancing is still uncommon (8.2%), often limited by a lack of training. Similarly, only 3.2% have participated in structured e-commerce or food/dress delivery through platforms or informal channels. Other activities include group chat-based product marketing (18.2%) and mobile recharge or agent banking services (10.9%), which act as small entrepreneurial ventures for youth and local shop owners.

This pattern suggests that while full-scale digital entrepreneurship is still limited, digital literacy has begun to open low-barrier income streams, especially where basic mobile services can meet local demand.

Qualitative data further revealed the economic aspirations and limitations of rural individuals in using digital tools: In Suhilpur (Brahmanbaria), Kamal Mia, 29, a mobile phone shop assistant said:

> *"Ami dekhi onek client Facebook diye product bikroy kore, amar ichcha ase amio ekta page khuli. Kintu bistarito jani na kivabe shuru korte hoy."*
> *(Translation: "I see many people sell products through Facebook. I want to start a page too, but I don't know how to begin properly.")*

In Doulotpur (Khulna), Shorna Begum, 34, a housewife stated:

> *"Amar meye amar phone-e YouTube theke cooking dekhe. Amio cheshta kori kisu shekhar jonno. Kintu ekhono etar kono aarthik uporjogita ase nai."*
> *(Translation: "My daughter watches YouTube cooking videos on my phone. I try to learn too, but it hasn't helped earn anything yet.")*

In Mirat (Naogaon), Tariqul Islam, 22, explained:

> *"Freelancing korte chai, amar bondhu ekta training center-e join korse. Kintu amader gram-e erokom kono facility nai."*
> *(Translation: "I want to do freelancing. A friend joined a training center, but we don't have anything like that in our village.")*

These narratives show the existence of aspirations and some informal learning, but also reflect structural constraints, such as lack of training, mentoring, and digital entrepreneurship ecosystems.

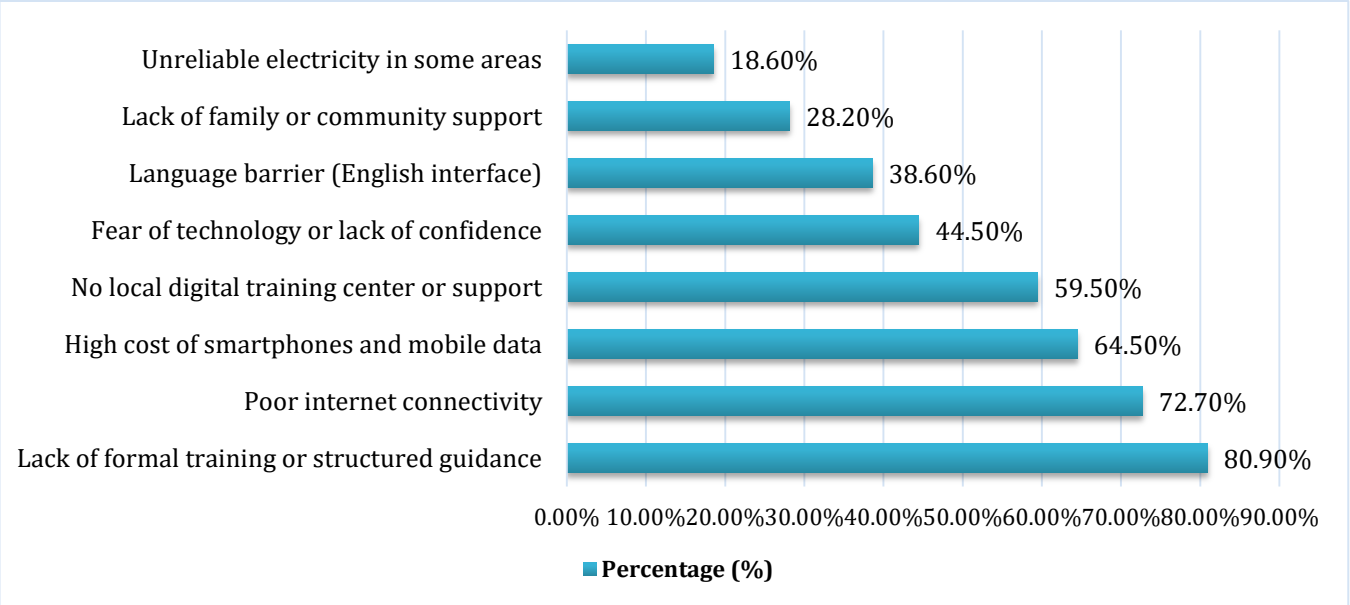
Several recent studies validate these field observations, noting the limited economic impact of digital literacy in rural Bangladesh: Alam and Haque (2022) found that most rural youth with access to smartphones use them for passive consumption, and less than 10% use them for income-generating purposes. Sultana et al. (2023) report that rural women showed growing interest in online businesses, but faced barriers including lack of training, market linkages, and financial tools. Hasan and Karim (2022) concluded that the potential for rural digital entrepreneurship remains largely untapped due to absence of structured skilling programs and local e-commerce infrastructure. The Bangladesh ICT Division's Digital Economy Report (2022) confirmed that while mobile internet access has grown, meaningful economic use of digital platforms remains confined to urban centers.

The findings indicate a disconnect between digital access and economic impact. Despite increased smartphone penetration and interest in online income opportunities, most rural users have not yet benefited economically from digital literacy. The few who have benefited often relied on informal networks or support from urban relatives, highlighting the need for structured training programs, digital entrepreneurship incubation, and rural digital ecosystems.

### *4.5. Barriers and Challenges That Hinder Effective Digital Literacy*

The survey captured the main self-reported constraints that limit rural people's ability to develop or apply digital literacy meaningfully. The data reflect a combination of structural, economic, and informational barriers.

**Chart 2:** Self-Reported Barriers to Effective Digital Literacy (N = 220)




The data from Chart 2. reveals that the most significant barriers to digital literacy in rural areas include lack of formal training (80.9%), poor internet connectivity (72.7%), and high cost of smartphones and mobile data (64.5%). Additionally, 59.5% cited the absence of local training centers, while psychological factors like fear of technology (44.5%) and language barriers (38.6%) also hinder access. Less commonly reported were lack of community support (28.2%) and unreliable electricity (18.6%), especially in remote locations. These barriers highlight the systemic and social challenges in rural digital inclusion.

The case studies offer rich personal accounts that illustrate these barriers in real-life contexts: In Chitulia (Netrokona), Jharna Akter, 36, said:

> *"Phone toh ase, kintu network thake na. YouTube video chalu korlei ghurey ghurey thake."*
> *(Translation: "We have phones, but there's no network. YouTube videos keep buffering and don't load.")*

In Chaktatardi (Narsingdi), Firoz, 19, shared:

> *"Amader gram-e kono training nai. Ami nijer theke Facebook shikhechi, kintu kichu boro shekha hoy nai."*
> *(Translation: "There's no training in our village. I taught myself Facebook, but I haven't learned anything advanced.")*

In Bakoi (Comilla), Rahima Begum, 41, mentioned:

> *"English e likha thakle bujhi na. Onno ke dekhate hoy."*
> *(Translation: "When things are written in English, I don't understand. I need someone else to help.")*

These examples highlight how technical limitations, linguistic barriers, and lack of support systems combine to suppress digital growth.

In this regards, Rahman and Akhter (2022) found that rural youth had limited access to formal training and mainly relied on self-learning, leading to superficial digital skills. Barkat et al. (2021) emphasized that poor infrastructure, high device costs, and inadequate internet access continue to restrict digital uptake in rural areas. Khan et al. (2023) argued that language and fear of technology were critical psychological barriers, particularly among women and older users. UNESCO (2022) stressed that digital literacy must be locally contextualized, affordable, and delivered in local languages to be effective in low-income communities.

## 5. Discussion

From the Researcher's Insight it can be said that "Digital Literacy at the Crossroads of Rural Development" mainly for developing countries like Bangladesh, India etc. This study, anchored in the lived realities of rural Bangladesh, offers an authentic and multi-dimensional understanding of digital literacy not just as a skillset, but as a pathway to social equity, community resilience, and participatory development. From the investigator's lens, this research goes beyond surface-level observations it penetrates the socio-technical textures of rural life, capturing both the potential and paradoxes of digital connectivity.

The findings reflect a deep digital presence but shallow digital purpose: while 84% of rural respondents owned smartphones, only 2% used computers, and over 60% engaged in digital platforms primarily for entertainment. Critically, fewer than 10% applied digital tools for educational or economic development. This is the gap between access and empowerment that this study uniquely identifies and contextualizes.

Equally revealing is the consistent desire for self-improvement among youth and women, despite their isolation from structured training and mentorship. From Kamal Mia's dream of starting a Facebook business to Shorna Begum's informal learning through YouTube, the aspiration is clear but the ecosystem is not.

This study's originality lies in its nuanced mapping of that ecosystem its visible and invisible barriers and in articulating a bottom-up digital inclusion strategy. It proposes context-specific policies such as localized digital training centers, integration of ICT into adult learning, and digital mentoring hubs for women and youth. These are not generic recommendations; they are born from voices of the field and aligned with feasible, community-rooted action points.

The findings of this study align with the Diffusion of Innovation Theory by showing that while awareness and initial adoption of smartphones are high, progression to functional and economically productive use remains limited. Barriers related to skills, connectivity, affordability, and cultural norms slow the transition from adoption to sustained implementation. These results extend the theory by emphasizing the role of localized training, language accessibility, and community-driven initiatives in accelerating diffusion in rural Bangladesh. This suggests that policy interventions must address both technological and socio-cultural dimensions to achieve meaningful digital empowerment.

More importantly, this research transforms "digital literacy" from a technical tool to a transformative right a right to learn, express, earn, and belong in the 21st century. It offers policymakers and practitioners a blueprint: not just to connect people to devices, but to connect development with dignity. Thus, the core contribution this study is the revela-

tion that digital inclusion must not start with infrastructure but with people, and it must end not with access, but with agency.

## 6. Policy Recommendations and Conclusion

**Table 9:** Policy Recommendations for Enhancing Digital Literacy and Rural Community Development

| Main Recommendation | Policy Development Area | Implementing Body / Authority |
|---|---|---|
| **Establish community-based digital training centers in rural areas** | Digital education & skills development | ICT Division, Ministry of Education, Local Universities, NGOs |
| **Introduce basic digital literacy as a part of adult education programs** | Lifelong learning, non-formal education | Bureau of Non-Formal Education, Minitry of Education, Department of Social Services etc. |
| **Offer subsidized mobile data and digital devices to low-income rural households** | Digital access and affordability | Ministry of Posts & Telecom, Private Telcos (CSR), INGOs etc. |
| **Develop local-language digital content for services, learning, and entrepreneurship** | Language-inclusive digital inclusion | National Curriculum & Textbook Board (NCTB), TTC, NGOs, local startups |
| **Launch digital entrepreneurship mentoring for rural youth and women** | Youth development & rural innovation | Ministry of Youth & Sports, SME Foundation, Women Affairs Dept. DSS etc. |
| **Strengthen rural internet infrastructure (network towers, public Wi-Fi zones)** | ICT infrastructure and rural connectivity | Bangladesh Telecommunication Regulatory Commission (BTRC) |
| **Engage local leaders, teachers, and imams in awareness campaigns** | Community mobilization and digital sensitization | Union Parishads, Imams, School Committees, Social Workers |
| **Monitor and evaluate impact of digital literacy programs regularly in both Rural and Urban Area** | Policy feedback and reform | Bangladesh Bureau of Statistics (BBS), Research Institutes like-ISWR |

Stakeholders expressed strong community interest in learning digital tools for economic and educational gain. Youth and women especially want access to local training and digital job pathways. Local leaders, teachers, and mobile shop owners can act as informal ambassadors for digital learning if included in implementation.

This study set out to understand the nature and impact of digital literacy on rural community development in Bangladesh. Through a combination of quantitative surveys and qualitative case studies across seven diverse villages, it revealed a complex landscape where digital tools are widely present but unevenly understood, accessed, and applied.

While smartphone ownership and social media usage are high, the functional use of digital literacy for education, income generation, and service access remains significantly low. Key barriers include lack of formal training, poor internet connectivity, affordability issues, and a shortage of localized content and community support. However, what stands out is the strong aspiration among rural youth and women to use digital platforms for self-improvement, entrepreneurship, and social mobility.

The study makes it clear that digital access alone does not equate to digital empowerment. A meaningful impact requires inclusive, context-specific strategies that address not only technological gaps but also social, educational, and cultural dimensions of exclusion.

Therefore, this research recommends community-based digital training centers, integration of digital skills into lifelong learning programs, and targeted mentorship models for rural entrepreneurs. Such initiatives should be guided by local stakeholders and supported by relevant government ministries, universities, NGOs, and telecom operators.

In conclusion, digital literacy is no longer a luxury but a foundational pillar of rural development. Bridging the digital divide in Bangladesh must begin with people-centered policies that unlock the transformative power of technology for all.

## Declarations

### *Author Contributions*

Md. Roni Mridha served as the supervisor of this study. He conceptualized and designed the research framework, provided academic guidance, and supervised all stages of the research process. The other three **group members** contributed equally by developing research tools, collecting field data, and analyzing both quantitative and qualitative findings collaboratively.

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### *Conflict of Interest*

The authors declare no conflict of interest.

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